101

BATH WATERS,

A

CONJECTURAL IDEA

OF THEIR

NATURE and QUALITIES,

In THREE LETTERS,

To ——— ———

TO WHICH IS ADDED,

PUTRIDITY and INFECTION

Unjuſtly imputed to FEVERS,

A cruel Public Grievance, attempted to be redreſſed; with ſome Account of the Nature and Management of plain Fevers.

By A. W.ilson M. D.
Reg. Colleg. Med. Edinb. Soc.

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L.DCC.LXXXVIII.

To Henry Harrington, M. D.

SIR,

I HOPE *you will pardon the liberty, which, without aſking your permiſſion, I have taken of inſcribing this ſmall publication to you; as an expreſſion of the ſincere regard and eſteem with which I am, ſir,*

Your moſt humble ſervant,

ANDREW WILSON.

BATH.

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A
CONJECTURAL IDEA, &c.

LETTER I.

SIR,

IN obedience to your requeſt, without any preliminary apology of inſufficiency for the undertaking, I ſit down to communicate to you the beſt idea I can of the nature and qualities of the Bath waters.

You might very probably have applied to ſome abler perſon for this piece of information, but to none more willing and bound to obey you. If in my ſollicitude to oblige you in this point, I am betrayed into any precipitance of judgment on the ſubject, I would not wiſh for more indulgence of ſuch miſtakes from any one, than I am confident I ſhall find from you.

When you apply to me for this information, I preſume it is not becauſe you are ignorant, that many learned and ſkilful inveſtigations have been made into the principles of the Bath waters, by perſons who were themſelves not only abundantly qualified for the undertaking, but who have been ſucceſſive aids and guides to one another in the execution of it; therefore I conclude that your requeſt neither implies that I ſhould renew their labours, nor that I ſhould entertain you with a detail of all that they have written on the ſubject; but merely that I ſhould communicate to you my conceptions of the ſpecific nature and qualities of a medicine in ſuch general uſe, and this I will do with all the openneſs and plainneſs I can.

As you never was upon the ſpot, it may not be improper to inform you, that there are three hot medicinal ſprings in Bath; all of them adjacent to, two of them cloſe by, one another. Each ſpring is incloſed by commodious buildings, comprehending both baths, and pump-rooms for drinking the waters. They are ſituated in the low or old City of Bath, which ſtands in a valley not much elevated above the level of the river Avon; but in ſecuring and cleanſing the veins of ſome of theſe hot ſprings their ſources, I believe, have been traced deeper below its bed than they break out above it, without any ſigns of having reached the greateſt depth of the ſprings.

The hills that ſurround the city and its adjacent plains on every ſide, though not very lofty, are pretty cloſe upon one another and ſteep, and they abound every where with cold ſprings flowing from their declivities : ſo that the hot ſprings ſeem to derive their waters from ſome deeper ſubteranean ſupplies and veins than thoſe which flow more ſuperficially from the ſides of the hills.

The quantity of water collectively iſſued from all the hot ſprings is very conſiderable, but at the ſame time individually they, in reſpect of the proportions diſcharged, differ remarkably from one another. The king's bath, the pump-room of which is twice in the day the general rendezvous of the company that reſort to Bath for the benefit of the waters, diſcharges above half a ton of water every minute ; that is, not leſs than eight hundred and fifty ſix tons in twenty-four hours, while the hot bath exceeds little more than an eighth part of that quantity, and the croſs bath ſomewhat leſs than one tenth in the ſame time. Theſe quantities, it is ſaid, are in no degree affected nor altered by the heat or cold, moiſture or drought of the atmoſphere, but continue the ſame in all ſeaſons. This I apprehend gives another preſumption in proof of the great depth of the bed of theſe ſprings.

The ſame invariableneſs is ſaid to hold as to the different degrees of the heat of the different ſprings; though that cannot have always been the caſe, if it is true that the ſpring denominated the hot bath or ſpring obtained that epithet from its being formerly reputed tho hotteſt of the three.[*]

The materials ſeparable by evaporation or otherwiſe from the different ſprings are much the ſame in quality and nearly ſo in quantity alſo. On account

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[*] According to Dr. Falconer's account of the heat of the different ſprings, which I dare ſay may be depended upon, that of the king's bath and of the hot bath is 116 degrees, that of the croſs bath 112 degrees.

of theſe materials all the three waters are ſomewhat heavier than common ſoft water. The general quantity of theſe ingredients ſeparable from the waters by evaporation, is ſaid to be in the proportion of about between two drachms (quarter of an ounce) and two drachms and a half in the gallon.*

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* That is not a ſcruple or twenty grains in the pint of water, a very ſmall proportion indeed, when we conſider that more than half that is abſorbent earth. Few ſprings accounted medical yield a ſmaller proportion of analyſable ingredients.—Some examiners of theſe waters have computed the analyſable ingredients contained in them, not to amount to one three hundredth part of the whole. If they had ſaid to one five hundredth part, I believe they would have been nearer the mark. However ſmall this proportion may ſeem, yet it amounts to an immenſe quantity of ſolid parts waſhed from their ſubterraneous bed in the courſe of one year: for though we ſhould admit the ſolid contents of the waters to amount only to an eight hundred and fiftieth part of the whole, (which is ſhort of the number of tons which the ſprings are calculated to diſcharge in twenty-four hours) this would bring the diſcharge of ſolid parts to three hundred and ſixty-ſive tons in the courſe of one year. What a prodigious excavation would this make in the courſe of two thouſand years, if the waſte is not by ſome means from time to time repaired.

Of theſe ingredients conſiderably more than one half is calcareous earth of lime-ſtone, chalk, or ſhells, (perhaps ſome marle) that is ſuch earth as combines with acids and deſtroys their acidity by forming with them a neutral ſalt. Hence the waters may be deemed gentle correctors of acidity in the ſtomach; but not ſo in any powerful degree.

The other ingredients contained in the waters are, neutral ſalts of different kinds, ſuch as ſea ſalt, glauber's ſalt, calcarous nitre, and ſelenites; but the quantity of all theſe in groſs, is ſo inſignificant, that conſidered complexly (for all neutral ſalts have in common a cooling attenuating quality, and are laxative in large doſes) they can ſcarcely be ſaid to have any ſenſible effect as alteratives upon the conſtitution; however as ſuch we ſhall ſuppoſe them to have ſome imperceptible effects; for as to the waters ſometimes proving laxative, that can be only accidental, owing to peculiarity of conſtitution, ſuch as laxity, irritability, or ſometimes to foulneſs or diſorders of the bowels.

Beſides the above ingredients, the waters when warm are, though very ſlightly indeed, impregnated with a particular ſpecies of ferrugineous vitriol, in ſuch ſmall proportion as not to exceed, according to the calculation of ſome nice examiners, $\frac{1}{60}$ or $\frac{1}{70}$ part of a grain in the pint of water. Now though the ſubtilty and activity of this vitriol, being formed with the volatile aerial acid called fixed air, may in ſome meaſure compenſate for the ſeemingly inſignificant quantity of it, and render it not altogether without ſome good effect, where vitriolic influence is required; yet I can ſcarcely think its effect is ſuch as to render the waters unſafe even in the deepeſt pulmonary conſumption or hectic ſtate, if there is nothing elſe in the waters to forbid the uſe of them in ſuch habits.*

I called it a particular ſpecies of vitriol, to diſtinguiſh it from ſuch as is formed with the vitriolic acid, which is ſtronger and more fixed. The combination between this volatile acid and the ferruginous particles is ſo ſlight and weak that it deſerts its baſis, and flies off of its own accord, as the water cools when expoſed to the air. Neither is there any ſign of the water's containing any more of this acid, than while it remains in them, is in a combined ſtate either with the iron or ſome of the other calcareous principles. Therefore it is in vain to impute any of the virtues of the waters to their fixed air; for while it is in the waters it acts as a neutral vitriolic ſalt only. Of this ſingular but ſcanty ſalt, the croſs-bath water is ſuppoſed to contain moſt, and to retain the marks of it longeſt, while the hot bath water, on the contrary, gives the weakeſt ſigns of it.*

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* I am verily inclined to think, that any of the Bath waters drunk as cool as the Briſtol is naturally, would be as medical, nay, perhaps more ſo in pulmonary and hectic caſes, than the Briſtol water is. From its analyſable ingredients there is no reaſon to ſuppoſe the contrary, and from its unanalyſable qualities, (of which in my third letter) I think the preſumption moſt in favour of the Bath water. The method of cooling them for the above purpoſe that I would propoſe, ſhould be in full bottles, with a drop or two of ſweet oil upon its ſurface inſtead of a cork.

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* Fixed air bears a ſtrong ſimilitude to the ſpirit of ſulphur in two reſpects, namely, in its elaſtic volatility, and in its very ſlight adheſion to all mild alkalies, iron and ſuch other bodies as are more powerfully attracted by the mineral acids: and yet I cannot help thinking that it is the radical principle and primary cauſe of adheſive attraction in moſt bodies; and that in mineral waters, &c. it appears to us as only a ſuperabundant principle, very ſlightly adhering to their other analyſable ingredients, becauſe theſe are already ſaturated with it as a principle of fixation. If this idea is juſt it rationally accounts for its being a ſtrong antiſeptic, powerfully counteracting any morbid tendency to a diſſolution of the animal, either fluids or ſolids. But this very circumſtance renders it ſtrange (if it is true) that it ſhould alſo act as a ſolvent of morbid concretions, ſuch as calculi formed by its own fixing influence.

Some have ſuggeſted that fire ought to be conſidered as a conſtituent ingredient of the Bath waters. That it is an ingredient of them, there is no doubt; though I apprehend not exactly in the ſenſe they mean. Their preſumption proceeds from a miſtaken idea in chemical philoſophy, which has been adopted of late, and has been pretty much recurred to in accounting for ſome of the phenomena of that ſcience.

Their notion is, that fire exiſts as a principle in ſome bodies more than in others, without any manifeſt ſign of its ſo exiſting in them. Some have denominated fire in this ſuppoſed ſtate, *latent heat*, a negative poſitive term, like the old inexplicable one *vis inertiæ*: others have conſidered fire as a ſubſtance in ſome caſes, fixable and capable of adhering to ſome bodies by ſome power like that which the chemiſts now diſtinguiſh by the name of *elective attraction*. I have no doubt but that fire exiſts in all bodies, and that in very unſuſpected ſtates: I believe it is even ſo intimately incorporated with them, as in a manner to conſtitute the very eſſence of their different ſpecific characters and qualities: but that fire can be really fixed in any body, ſeems to me impoſſible; *motion being as eſſential to its ſtate and character as fire, as materiality is to its local exiſtance.*[*]

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[*] If light and fire are ſubſtantially the ſame, (and I muſt beg leave to ſay, that it ſavours more of ſceptical cavilling, than of philoſophical reſearch, to doubt it) there is one circumſtance relative to the mobility of this body that philoſophers ſeem never to have duly attended to. According to their own obſervations and calculations, the motions of light are as inſtantaneouſly and rapidly projected by the ſlighteſt reflection, where no ſenſible heat is generated, as from the moſt vehement action of fire in the orb of the ſun itſelf: it is even by the reflections of light from the ſatellites of the planets which have never been diſcovered to convey any ſenſible heat, that the velocity of the light from the ſun to this earth is calculated.—This prodigy, as it may well be called, the aſtronomers think they have obſerved and aſcertained; but a ſolution of the my-

All that can be determined then, as to the quality of Bath waters from their analyſable ingredients, is, that they are moderate correctors of acidity ; that they are ſtill more moderately cooling on account of their neutral ſalts, and almoſt imperceptibly bracing.

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ſtery they ſeem never to have thought of detecting or enquiring into. At any rate it ſeems palpably abſurd to talk of fixing by the weak remora of elective or any other known power of attraction, a ſubſtance allowed to be conſtantly moving, and that too in all directions with ten thouſand times, I may ſay, the velocity of a ball out of the mouth of a cannon.—But whenever ſcience degenerates into the hypothetic marvellous, it ſets all conſiſtency at defiance.

The very ingenious Meſſrs. Meyer and Beaumé ſeem to have penetrated, or to be penetrating into a juſt train of reaſoning towards the interpretation of the action of fire in other bodies, which the otherwiſe ingenious Monſ. Macquer labours hard, but unſucceſsfully to refute. See additions to his dictionary of chemiſtry under the article *cauſticity*.

To refer the qualities of the waters to any inimitable mixture of theſe ingredients in them, I own I have no conception of that. I admit that nature has an inimitable power of variouſly mixing, transforming, and digeſting the ſame materials taken in by different vegetables and animals for their nouriſhment; nay, of digeſting and maturating them in mineral productions, or unorganiſed bodies alſo: but that nature has any inimitable mode of ſimply diſſolving ſalts or earths in water, that are recoverable again from it in their native forms, is what I can ſcarcely reconcile my judgment or underſtanding to. Simple ſolution is a work of nature itſelf; but if there are any different inimitable modes of it, they are totally unknown to me.

I refer you to my next for my further thoughts on this ſubject, and am, &c.

LETTER II.

I HOPE, ſir, you do not ſuſpect that from what I have ſaid in my former, I mean to depreciate the virtues of the Bath waters, or leſſen them in your eſteem: it is certain they are endued with powers and qualities that the ingredients ſeparable from them by art will by no means account for; it follows therefore, that theſe muſt be referred to ſome other cauſes either occult or manifeſt, unſearchable or ſearchable.

Beſides their analyſable ingredients the Bath waters diſcover in themſelves two other ſenſible qualities, namely, *manifeſt heat*, and a *manifeſt ſulphureous flavour*. It is natural, therefore, to enquire how far theſe circumſtances may contribute to the medicinal virtues of theſe waters.

That the heat of the waters have the ſame medical qualities with any other water heated to the ſame degrees, by whatever means, is, I ſuppoſe, what no one will or can doubt. Theſe, with ſubmiſſion, I will venture to ſay, are of more general importance than is countenanced by the preſent practice of phyſic.

But it may be aſked, is there nothing ſpecific in the nature of the heat of the Bath waters? If I ſhould anſwer in the affirmative, without explaining my ideas of that matter as diſtinctly as I can, I might, not unjuſtly, be charged with the ſame kind of abſurdity as I cenſured in thoſe, who ſuppoſed there may be different inimitable kinds of ſolutions of ſalts in water. Now, therefore, as I am of opinion that the cauſe of the heat of the Bath waters is alſo the immediate and direct cauſe of their principal virtues. I will in the firſt place explain to you my conception of the manner in which they acquire their heat.

I cannot preſume to differ from the common and general opinion of the manner and cauſe of the generation of heat among mineral mixtures; which in all caſes ſuppoſes ſulphur and aqueous moiſture, as two indiſpenſible ingredients of ſuch fermenting ſubſtances as produce it. Water indeed cannot be called a direct but only an intermediate cauſe in the production of ſuch heat. *Sulphur* was for a long time uſed by the chemiſts as a general name, not only for the inflamable principle in bodies, but alſo for one of the elementary conſtituent principles of all bodies; which term is now ſuperſeded by that of phlogiſton: but I ſpeak of common mineral ſulphur,

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which, though a ſubſtance ſuſceptible of inflamation of a certain kind and degree, is much more allied to acidity than to inflamability.*

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* The ancients ſometimes when they afford us no other documents of their knowledge of ſubjects, give us marks of the ideas they entertained of them by the names they gave them, or by the ceremonial uſes to which they applied them. We have an example of both theſe in regard to ſulphur, which was uſed by them in all their luſtrations and purifications, and to which the Greeks very emphatically gave the name of Θειον expreſſing thereby, I fancy, ſomething divine in its nature.—We know no ſubſtance perhaps in nature, none at leaſt in the mineral world of ſuch a myſtic and complex character and uſe. It ſeems in one or other of its forms eſſential to the generation of all mineral productions; by different circumſtances of digeſtion, it is ſuſceptible of various and ſeemingly oppoſite characters. It is wholly inflamable and, by inflamation, it is almoſt wholly convertible into acidity: under the firſt it ſeems to contribute to the phlogiſtic character of all mineral ſubſtances, and under the ſecond to their coheſion and denſity. The conſtituent parts of ſulphur are uniform, and ſeemingly of this ſingular character, that they are ſuſceptible of either a phlogiſtic or of an acid modification. By combuſtion in the open air ſulphur paſſes through the one ſtate into the other, being inverted into acidity in the very action and inſtant of inflamation. This ſpecies of inflama-

It is therefore intenſely diſpoſed to run into violent combination with all ſuch other mineral ſubſtances as are deſtitute of manifeſt acidity. It proves perfectly corroſive and deſtructive of the adheſive texture of ſome of the ſubſtances it ſo attacks. This inherent power in ſulphur of corroding or abſorbing certain minerals, is always exerted by the intervention of aqueous humidity enabling it to unfold its latent acidity.

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bility, of which ſulphur in its native ſtate is ſuſceptible, is known to the moſt vulgar obſervation to be very different in its appearance from every other ſpecies of imflamability. But chemiſts muſt know, that ſulphur or its acid is ſuſceptible of converſion into another ſpecies of inflamable or phlogiſtic ſubſtance, upon its mixture with iron, alkalies or quick lime. In the caſe of its mixture with iron, I am aware it may be alledged, that the phlogiſtic air generated may proceed wholly from the iron, which will not be ſo eaſily proved: but in the other caſe, as neither cauſtic alkalies nor quick lime are known to contain any phlogiſtic matter, the generation of it muſt proceed from the ſulphur alone. I know that the inverſion of ſalts and oils into one another is neither ſuppoſed, nor will readily be admitted into the preſent theory of phyſics, but there are ſtrong indications, There is no mineral ſubſtance known upon which ſulphur, under ſuch circumſtances, acts more vehemently, and in ſo doing, generates more heat than upon iron and calcarous ſubſtances. The Bath waters contain evident, though ſlight, ſigns of both theſe principles concurring in the generation of their heat. But then theſe ſigns are ſo very ſlight, that it is abſolutely impoſſible ſuch a diminutive quantity of theſe materials as the waters exhibit ſigns of, ſhould of themſelves produce

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that all the proceſſes of nature amount to no more than a continual ſeries of inverſions and reinverſions of forms into one another; nature diſburſing from her treaſury, and recollecting into it again the ſame materials after their paſſing through an innumerable ſeries of tranſmigrations; ſo that the moſt ſimple idea that the courſe of nature ſuggeſts to us is, that none of its principles or radical forms known to us are immutable under her influence, however ſome of them may appear ſo to us. The incomparable Becher may be conſulted on what he ſays relative to this ſubject, in his compariſon between the proceſſes of fermentation and combuſtion, in a ſmall treatiſe which he wrote, I believe, either when he was in Cornwall, or in the Iſle of Wight.

duce any ſenſible degree of warmth. They are only, they can be no more than, very ſlight abraſions or effloreſcences brought from the fund of materials where the heat is generated and maintained.

I repute the ſtory recorded of Mr. Rochas, if true, to be quite unintelligible, from want of circumſtances neceſſary to ſupport even the credibility of the fact. To me it ſeems exceedingly improbable that a ſtream of cold water, however ſmall, ſhould immediately on its entering a vein, we ſhall ſuppoſe of pyrites, have been found hot, unleſs the materials of which the vein was formed had been found much hotter than the water: for I dare venture to affirm, that no water, at leaſt none whoſe analyſis we are yet acquainted with, contains one twentieth part of the effervеſcible materials, that would be ſufficient to render them the cauſe of its heat; nor can water inſtantaneouſly catch ſuch heat, merely by gliding through veins of ſuch fermentable materials.*

Hot mineral waters therefore muſt acquire their heat, either by being, for ſome conſiderable time, ſtagnant upon a fermenting bed of ſuch materials; or within the reach of the hot fumes that ſuch fermenting beds are conſtantly diſcharging into the waters in their ſtagnant ſtate. The waters may bring the other ingredients of their compoſition from other parts of their ſubterraneous paſſage into this ſtagnant ſtate: though it is not neceſſary to ſuppoſe that they muſt do ſo;

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* Upon further examination into the fact, I am apt to ſuſpect that ſome miſtake muſt have happened to Dr. Oliver (or rather Dr. Peirce) in reporting Monſ. Rochas obſervation. Junker in his Conſpectus Chemiæ, in the article of *water* mentions the ſame M. Rochas, who ſays, he traced a mineral ſpring on the Alps, with circumſtances ſimilar to thoſe related by Dr. Oliver: but Junker makes no mention of the water of the ſpring becoming hot at a particular ſpot of its under ground courſe, but only of its becoming there mineraliſed.

ſo: but it ſeems to me next to a certainty that they can only derive their ſymptoms of iron and ſulphureous gas, perhaps alſo moſt of their calcareous earth, immediately from the place, whatever its extent may be, where their heat is generated and maintained.

It is more than probable then, that the hot ſprings of Bath are iſſued immediately from a ſubterraneous lake (of what dimenſions or how far below ground it is impoſſible to determine) all, or part of whoſe baſe is in a ſtate of mineral fermentation; or is in communication with veins through which the hot fumes of ſuch a fermentation adjacent to the lake diſcharge themſelves into it. This lake cannot be ſuppoſed to be a ſmall one; when it is conſidered what a large ſtream is continually iſſuing from it by the three ſprings taken collectively: for it is with great probability preſumed, that they have all one ſource; and that any ſmall difference among them either as to heat, or their ingredients, is merely the different length of their various courſes, or ſome ſuch circumſtance as may ſlightly affect them, between their departure from the reſervoir and their breaking out above ground.

If it is objected, that it muſt require an intenſe degree of heat, even equal to that of actual fire, to heat ſo large a volume of ſtagnant water as I ſuppoſe the lake may be that feeds the ſprings. I grant that it would do ſo, if the ſurface of the water was expoſed to the acceſs of the atmoſpheric air; but even in that caſe, there is a wide difference between the quantity of heat neceſſary to warm, in any given degree, water that is cold, and that is neceſſary to keep up the heat that it has once acquired. For example, the ſmall feeble flame of ſpirit of wine in a lamp, will keep a tea-kettle full of water boiling hot, though it would never make the water boil if it was cold. But beſides the excluſion of the common air from this lake of hot water, we muſt conſider that the cavern which contains it poſſeſſes all the heat of the water itſelf; and a fluid will never cool while the veſſel containing it is hot, and both are excluded from the reach of all impreſſions of atmoſpheric cold.

In my next, I ſhall proceed to give you my idea of the virtues which I apprehend, the waters derive from their impregnation by the heat, and am, &c.

LETTER III.

SIR,

IT becomes next our buſineſs to enquire what qualities and virtues the waters may rationally be ſuppoſed to contract from the manner of their being heated. My ideas of that matter I ſhall reduce to the two following points: firſt, the change produced on the waters themſelves, or any moiety of them, by the firmentative action which gives them their heat: ſecondly, the impregnation not ſubject to analyſis that they may derive from the direct cauſe of their warmth.

1. Water is the only terreſtial ſubſtance that can be accounted a ſimple element,

ent, whoſe conſtituent parts, ſo far as we can diſcern, are all homogenous; but then they are, in my opinion, ſo far from being immutable; that there are not wanting the ſtrongeſt cauſes of preſumption, that its particles are not only mutable in their ſtructure, but that they are the digeſtible ſperm of all other terreſtial ſubſtances. If water is the mutable ſubject of all other bodies, it can ſcarcely be ſuppoſed that under its immence variety of expoſures, it will not be ſubject to various impreſſions, which may change its properties, though it ſtill retain its character as water.*

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* I know that the great Boerhaave, whoſe judgment I highly reſpect, is of opinion that the conſtituent particles of water are unalterable, but the ſoundeſt underſtandings are ſometimes miſtaken. I cannot help looking upon all the objections that I ever heard made to the famous Van Helmont's experiment in proof of water's being the direct material nutriment of vegetables, as frivolous and inconcluſive.

This I need not enlarge upon as a rational induction, ſeeing it is well known as matter of fact, that in our atmoſphere, water, in the different expoſures of wells, fountains, rivers, ponds or lakes; ice, hail, ſnow, rain, &c. acquires different qualities, by the alteration that theſe different circumſtances make, it is probable, upon its elementary conſtituent particles. Why then, may not the evaporable particles of water receive different ſpecific characters or qualities from the different ſpecific modes in which they are heated. For example, when oil of vitriol is mixed with water, an intenſe heat is generated, by the violent rapidity with which the aqueous particles are ſucked into the ſalt, and when heated are repelled again, giving place to others, till the ſolution becomes uniform and complete. Can we avoid concluding in this caſe, that the water muſt acquire a particular quality from this mode of its being animated with heat? from obvious circumſtances,

ſtances, I am perſuaded it does, and I know not one reaſon ſufficient to prove, or to render it even probable that it does not. Quick lime is diametrically oppoſite in its nature to oil of vitriol; water mixed with it produces as much heat as with the other: and the aqueous effluvia raiſed by theſe oppoſite mixtures have very different flavours—even gold itſelf, which yields to no ſolvent but one, quenched in water, is ſaid to impart to it a particular flavour or taſte.

Reaſon, therefore, obliges us to conclude, that when heat is generated in water by its own intervention or mixture with other cold ſubſtances, its particles muſt thereby undergo ſome phyſical change.

Upon the whole then, I think we ſhall be juſtified in making this deduction or corollary; That water digeſted *in occluſo* in a heat generated by a mixture of ſome of its own parts, with ſulphureous and other principles, without the acceſſion of any actual fire, is likely to acquire ſuch a change of its conſtituent particles, or at leaſt of ſome of them, as may in part enrich the water with thoſe medical qualities the waters of Bath are found to poſſeſs.

2. As to the ſecond point, namely, the unanalyſable ingredients with which the water is impregnated. There is no manner of doubt but that the Bath waters, along with their heat, acquire a ſpecific, difinable impregnation, though too ſubtle to be caught, to which I have no heſitation in aſcribing their moſt eminent and powerful qualities.

Inflamable gas is plentifully generated in the reſolution of pyritous ſubſtances, which is always attended with firmentative heat. Though it is of the nature of an highly inflamable oil, yet, in the form of vapour, it freely mixes with water; as perhaps any inflamable ſubſtance would do in the ſame divided ſtate. It appears to me that Bath waters are no further either ſulphurous or calybeate than they are impregnated by that pyritical ferment which ſupports their heat: I think I am juſtified, therefore, in concluding that they derive their heat and their characteriſtic qualities from the ſame immediate cauſe.

If the analyzing of waters means any thing, it ought to be in order to eſtabliſh *a priori* their virtues, and conſequently to determine the propriety, and the mode of uſing them. But ſometimes, after the moſt laborious analyzes we are refered to ſomething inimitable in the compoſition, and mixture of the ingredients in waters, as the ſource of their virtues, which are only diſcoverable by experience and matter of fact. I admit, that well atteſted facts, which I believe are as numerous in ſavour of the Bath waters as of any, are a very ſufficient authority for recommending them: but, if after moſt accurate inveſtigations, phyſicians, as well as the body of their patients, muſt refer the virtues of waters wholly to matter of fact, or ſomething inimitable in their compoſition: then, ſuch inveſtigations are made to very little purpoſe: for in that caſe, it is not the ingredients in the waters which produce their virtues, but ſome inexplicable compoſition of them; ſome ſuch thing as is produced by the ſecretion and digeſtion of fluids in the veſſels of vegetables; which, out of the ſame nutritive materials, can produce either a lilly or a roſe.

Acid gas, commonly called fixed air, has by no means, eſcaped the attention of medical people: which they may find as plentifully in briſk cider, or ſpruce beer as in a ſaline draught in the act of efferveſcence: but, inflamable gas has not only eſcaped their attention, but whenever, without their intention, or permiſſion, it has inſinuated itſelf into their compoſitions, they have taken particular care to avoid it: as, in the waſhing of ſal polychreſt, and the almoſt total diſuſe of the balſam of ſulphur; while the diſguſting ingredient was in fact the moſt active and important one in the compoſitions.

This inflamable gas, called alſo *hepatic air*, which I ſhall call the *progeny of ſulphur*, becauſe, I do not think it can properly be accounted the inflamable part of it only; but rather, an inverſion of its ſubſtance or corporeal particles into a volatile and more perfectly inflamable modification.* I have lately ſeen an

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* As in my idea of the nature and origin of bitumens, and other mineral combuſtibles, I may be deemed to differ from ſome very reſpectable names, and of great authority, I ſhall here aſſign my reaſons for doing ſo. Macquer is inclined to refer all the bituminous claſs of ſubſtances to a

account of ſome experiments tending to confirm this idea of the matter.

This inflamable vapour, I conſider as one of the moſt active, to be at the ſame time, to the ſenſe, mild principles that can be employed in medicine: even ſulphur in the form of flowers, which is not in quite ſo bad repute as this progeny of it is amongſt phyſical folk, never exerts its efficacy

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vegetable origin: Newman ſeems, though he does not ſpeak deciſively, to lean to the ſame opinion: Juncker, with more reaſon, in my judgment, objects to that idea, and rather chuſes to refer all mineral inflamables to an original primordial ſtock of that ſpecific ſubſtance lodged in the bowels of the earth. Stahl likewiſe, whoſe authority I ſhould be proud of being ſupported by, objects to the idea of bitumens being a converſion out of ſulphur.

My reaſons for differing from ſuch reſpectable authorities are, firſt, wherever bituminous ſubſtances abound, there is always to be found an intermixture of pyritous or ſulphurous ſubſtances as of parts that had not been fully converted into the bituminous form: ſecondly, in the diſtillation of all bituminous ſubſtances, there is always produced a volatile acid, ſimilar to ol. ſulph. per camp. thirdly, in the decompoſition of ſulphur without inflaming efficacy in the animal conſtitution, but in ſo far as it is ſubtiliſed into this volatile inflamable ſtate; a ſtate which the inflamation of ſulphur in the open air cannot reduce any of its parts to, as is manifeſt from both the ſingular pungency of its ſmell, and the colour of its flame, when burning.

it, there is always produced an inflamable gas, called phlogiſton, which has all the characters of the inflamable part of bitumen reduced to vapour.

I think theſe conſiderations nearly amount to a proof, that ſulphur, under certain circumſtances, by the energy of its own phlogiſticated character is convertible into bitumen: Upon the whole, therefore, I am for the above reaſons, ſtrongly inclined to conclude that beds of anthraceous ſubſtances, ſuch as coal, &c. have been originally beds of pyrites, digeſted by nature into their preſent inflamable character, and that all the bitumens, petroleous mineral pitches, and oils, are fermentative exſudations from ſuch beds or veins of pyrites either tranſformed or transforming into the more inflamable ſtate, forced or diſtilled from theſe beds by that internal ſelf-generated heat among the materials that is acceſſory to the converſion of the ſulphureous into the bituminous nature.

It is impoſſible to determine in what quantity the Bath waters are impregnated with this vapour: for while the flavour of it to the ſmell is, particularly to ſome people, very faint; the ſmoothneſs of the waters upon the palate ſeems to indicate the impregnation to be very conſiderable. I ſhould be inclined to ſuppoſe that a great deal of that effluvia depoſits much both of its volatility and of its olid character, by its detention and digeſtion among the waters in their ſubterraneous bed, without any poſſibility of its eſcaping from them, probably for a long time; if the reſervoir or collection of the waters be large, as there is much reaſon to conjecture it is. We know, in fact, that ſimilar inflamable vapour abounds much in many places when it betrays very faint tokens of its exiſtence to the ſmell.

But in fact, while it is impoſſible to determine in what quantity this attenuated ſubſtance exiſts in the waters, we know for certain that its active power is very great in very ſmall quantities: which ſeveral chemiſts have experienced in their elaboratories to their no ſmall danger.

The ſpecific properties of this active principle are theſe; 1. It has all, and in ſome conditions even more than all, the volatility of any known either alkaline or acid ſpirit; without, firſt, any of their irritating pungency, and ſecondly, without hazard of having its volatility ſuppreſſed or ſubdued in the conſtitution by ſaturation with oppoſite principles, as either acid or alkaline volatiles have; theſe cannot go far in the animal circulation without encountering oppoſite principles in the conſtitution, which on combination with them, render them neuter and ſuppreſs their activity.

But with regard to this ſulphureous principle, it is a point I cannot take upon me to determine, whether it can be animalized by the aſſimilating powers of the human frame, or not.

Now, *a medicine is no longer a medicine in our conſtitution than while it remains unaſſimilated thereby.* Whenever it is animalized it becomes part of ourſelves, and ſo is diveſted of its medical quality. The more tenacious therefore any ſubſtance is of its own ſpecific character, after being taken into our conſtitution, the longer and more powerfully it acts as a medicine. *This is the plain and obvious reaſon why* mercury *and* antimony *are ſuch powerful medicines:* the vital principle in the animal conſtitution has not power ſufficient to alter or aſſimilate theſe ſubſtances into its own nature; therefore they act with all their ſpecific momentum and qualities while they remain in it.

2. Further, another quality of this gas is that, as I have already hinted, it is ſo far from being irritating, that it is, on the contrary *anodyne*; nay, there is reaſon to ſuſpect that if it was taken in an overdoſe, it would prove *narcotic*.

3. Again, it is wonderfully healing, in all caſes of ſores or ſolutions of continuity either external or internal: this is what convinces me of what I hinted before, that the Bath waters under proper management might be rendered a uſeful medicine in conſumptive caſes. Of ſulphur and its progeny, I dare be bold to affirm, that we know no other medicine of ſuch healing virtue and efficacy.

When the qualities of medicinal waters are once preciſely known, or can from circumſtances be ſhrewdly gueſſed at; the extent of their utility, the ratio of their effects, the caſes to which they are adapted, and the method of directing and regulating the uſe of them, becomes known of courſe. Upon the whole, thus much in general may be ſaid of the virtues of the Bath waters, that they give additional warmth and vigour to the circulation; they expand and enrich the fluids; they ſooth any irratibility of the ſyſtem, and in ſome degree prove intoxicating and narcotic; they plump the parts, ſoften the ſkin, and promote perſpiration; they tend to heal and dry up all ſores internal or external; and they ſweeten the blood, ſheathing and correcting any acrimony therein.

After having communicated to you my idea of the ſpecific qualities of the Bath waters; the information you wanted does not, I apprehend, require that I ſhould enter into any detail of the various maladies to which the internal uſe of them is adapted: from their leading characters that may be determined *a priori*, without

out appealing to the numberleſs cures performed by them.

It may be of ſome conſequence however, to perſons coming or ſent to Bath for the uſe of the waters, to mention, firſt negatively, that they will by no means agree with perſons of a full habit, or labouring under any diſeaſe that ariſes therefrom, unleſs the waters themſelves either prove laxative, or ſuch habits are firſt properly reduced by a cooling and light regimen, both as to the quality and quantity of their diet, which ought alſo to be ſtrictly adhered to during their uſe of the waters. I have known ſeveral inſtances of perſons who have reſorted to Bath for complaints ariſing ſolely from plethora and a too vigorous circulation; with ſuch the waters conſtantly diſagreed. This is the more neceſſary to be attended to, becauſe frequently the ſame morbid ſenſations, eſpecially in the ſtomach, are felt and complained of by perſons of oppoſite conſtitutions, and in fact, are excited by oppoſite cauſes. Secondly, it may be adopted as an aphoriſm or maxim in regard to the ſafe and advantageous uſe of theſe waters, that the lower and cooler ones diet is, in ſo much the larger quantity they may be uſed with ſafety and benefit; and I am perſuaded that where important benefit is wiſhed or expected to be obtained from them, they ought to be drunk in much larger quantity than is at preſent the faſhion to uſe them in.

As to the external uſe of the waters; the benefits of ordinary warm bathing itſelf are ſo extenſive and various, that it is a problem of no eaſy diſcuſſion to determine all the variety of caſes in which the external uſe of the Bath waters is expedient and ſalutary.

The uſe of the thermometer is now ſo familiar at Bath, that the very guides are learned upon that ſubject: but after all, every ones own feeling is the moſt certain directory in that reſpect. There is a conſiderable difference among conſtitutions and textures of ſkins as to the degrees of heat at which they feel poſitive warmth; what may be only a tepid bath to one, may be a poſitively warm bath to another. The moſt uſeful application of the thermometer would be to the aſcertaining according to every ones own feeling, the degrees of heat between tepidity, or the ſame degree of heat with their ſkin, and the greateſt degree of heat that ſuch ſkin can bear: then the intentions of a *tepid bath*, a *warm bath*, or a *very warm bath*, might be preciſely adjuſted: but I look upon the thermometer as a ſuperfluous nicety where ſenſation is concerned. A *tepid bath* is moſt ſuitable for perſons of firm and tolerably ſound conſtitutions; it is leaſt diſturbing to the natural ſtate of the circulation, and moſt antiſpaſmodic. A *warm bath*, which ought to be ſenſibly hotter than the ſkin, is moſt favourable for abſorption; it alſo dilates the fluids, and of conſequence expands the veſſels, eſpecially the ſubcutaneous ones, it alſo enlarges the pulſe and ſomewhat quickens it. A *very warm bath*, that is ſuch a degree of heat as a perſon can bear and no more, beſides the effect of a warm bath, brings a degree of redneſs or ſlight ſuperficial inflammation upon the ſkin, and therefore is moſt calculated for preſent and ſpeedy relief in all internal achs and pains; whether gnawing or more ſharp and acute; which relief ought to be ſeconded by judicious management afterwards: but to anſwer any of theſe purpoſes, ſome attention muſt be paid to the time of continuance in the bath.

Here I ſhall cloſe my correſpondence with you on the ſubject of Bath waters, and am, &c.

ADVERTISEMENT.

THE original draught of the ſubſequent paper was projected for the public ſervice in a different form. It had often been ſuggeſted to my mind, that it would be an act of humanity and benevolence, and prove of ſome real benefit and advantage to the public, to publiſh, and periodically to republiſh in the news-papers in general, a few monitory cautions and directions relative to ſuch epidemics as are annually more or leſs recurrent, at particular ſeaſons. Many ſuch complaints, by no means dangerous in their own nature, often prove not only dangerous, but fatal among the people at large, merely from their want of the knowledge of ſome few very ſimple means both of alleviating and of preventing ſuch diſorders, at little or no expence.—I do not mean in order to make the people doctors, but to teach them when they are neceſſary, and when in not a few ſimple and eaſy caſes, they may do without them. People have no conception how many painful and dangerous diſorders may be either relieved or avoided by very ſlight attention to themſelves in proper time.

Full of this idea, and as a ſpecimen of ſuch a plan, I ſent to the editors of the *Bath Journal*, ſome ſhort remarks and directions relative to autumnal diſorders of the bowels, which they were ſo good as to publiſh in their paper of the 3d of September laſt, and which were intended to be ſucceeded by ſomething upon the ſame plan, on autumnal and other plain fevers. But the misfortune is, that things ſo communicated to the public (unleſs they are repeatedly inculcated at the proper ſeaſons, and people are readmoniſhed to be upon their guard) for once only, whatever their conſequence and importance may be, are, if at all attended to, ſoon forgotten and loſt. I thought therefore, if there was any thing uſeful, or worthy of attention in the following practical remarks on plain fevers (which are now indeed enlarged with ſome phyſiological views on the ſubject) they had a better chance of being attended to, by being annexed to the preceding *idea of the nature of the Bath waters.* For, as I have ſaid, any ſubject treated of in a newspaper, has little chance of being duly attended to, unleſs ſome plan was eſtabliſhed for the periodical repetition of it. Health is a valuable thing; but people are apt to treat it as they do their duty, and ſupinely forget the moſt obvious and eaſily avoided dangers, unleſs they are repeatedly put upon their guard.

REFLECTIONS

ON

FEVERS.

REFLECTIONS

ON

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SECTION I.

THAT medicine, like all other profeſſions, is obnoxious to error and abuſe cannot be doubted. I do not know a more material injury the public have at any time ſuffered from any of the dogmata in medicine, than what it has felt by the introduction of the term *putrid*, (in the recent ſenſe of that phraſe) as a too common and general denomination of plain fevers.

The bulk of mankind, eſpecially the young and thoſe of full habits, have a natural dread of fevers, which it is exceedingly inhuman to inflame, as the addition of the term *putrid* to *fever* does, even to the degree of abſolute terror; by people annexing the idea of *infection* alſo to *putridity*. When fevers are prevalent, nothing is heard of in the country, and amongſt unſkilful practitioners but *putrid* fevers: and to be ſure it is a very convenient idea for them to propagate; for as the term is now underſtood to imply the moſt fatal ſpecies of fever, it anſwers the two-edged purpoſe of an apology for bad ſucceſs, and of magnifying their ſkill when their patients happen to recover.

I am ſurprized that it has not long before now occurred to ſome gentleman of confeſſed knowledge and authority in the profeſſion, to ſtem that torrent of abuſe, and alleviate the influence of its cruel impreſſion on the minds of the public; which not only drives apprehenſive people from every part of the country, where the moſt common fever happens to be epidemic, but terrifies them from fulfilling, but with dread and terror ſufficient to produce a bad fever, the offices of humanity due to their ſick relations and moſt intimate friends.

The ſubject has often occurred to me, and would have been attempted long ago, but for the apprehenſion of being inſenſibly led thereby more deeply into the conſideration of the nature of fevers, than my late or preſent degree of application would be ſufficient to accompliſh. Humanity will however, I hope, apologize for my attempting to offer ſome looſe hints, for the relief of the minds of my fellow-creatures upon this ſubject, without that extenſion and regularity that might entitle them to the name of an eſſay. If any practitioners can derive any aſſiſtance or improvement from them alſo; ſo much the better.

1ſt. The firſt obſervation I make, for the benefit of general information, is, that formerly, when the ſcience of medicine was taught and ſtudied in a more regular and ſcientific manner than, in my apprehenſion it has been of late, in this country at leaſt; the term *putrid*, as applied to fevers, had a very different ſignification and meaning from that affixed to it within theſe few years. Then, a putrid fever meant no more than any, or every fever in which there was a concoction and critical diſcharge of the morbific matter in order to the cure or extinction of the fever. The change of the morbific matter that qualified it for being diſcharged by the different emunctories of the body, they conſidered as putrefaction, juſt as we do *pus*, or the ſuppurated matter in an impoſthume.

It is not my buſineſs here to aſcertain the propriety or impropriety of theſe ideas, but only to ſtate them: from what I have ſaid, the reader will obſerve, that the old notion of a *putrid fever*, had nothing ſhocking in it; but in the preſent day that ſenſe of a *putrid fever* is ſuppreſſed and forgotten. I am not certain whether the very idea of the neceſſity or reality of concoction and criſis in fevers is not treated as hypothetical by ſome of great name in the medical line. The term *putrid* is indeed retained, but it has totally changed its ſignification and meaning into that of a fever of the moſt malignant and infectious kind;—a fever that is rarely to be met with, except in crouded ſhips, hoſpitals and jails; and even then ought only to be called putreſcent, or apt to degenerate into putridity.

2dly. My ſecond general obſervation is, that no fever of which the ſick recover, ought to be called *putrid*:—for, wherever a fever either actually commences with the putridity of the fluids, or in its courſe degenerates into that ſtate, it is impoſſible the patient can recover.

3dly. Every fever, of whatever kind it is, becomes *putrid* before it becomes mortal. Whenever the progreſſive motion of the blood, and the powers of the circulation are ſo oppreſſed by any fever, that they can no longer reſiſt a tendency to fall into inteſtine fermentation; then putrefaction begins. So that if putrefaction is made a ſcare-crow to frighten and alarm people, they ſhould alſo with equal reaſon be urged to fly from all fevers, and indeed all mortal diſeaſes and dead bodies. I have ſeen a perſon in an ordinary dropſy more putrid before death, than ever I ſaw a perſon in any fever, except one, and that was in a miliary, not a petechial ſever. But

4thly. *Putrefaction* and *infection* are quite different things. They have ſo little certain connection with one another, that it is really queſtionable whether proper putrid effluvia are at all the immediate vehicle of infection. We know in the caſes of the ſmall pox, the venereal diſeaſe, the itch, the leproſy, &c. that it is not *putrid* effluvia, but effluvia of a different concoction, generated by theſe ſpecific diſeaſes, that convey infection.

5thly. When fevers or other diſeaſes are epidemic at any particular ſeaſon, it is very common to confound *infectious* and *epidemic* with one another. For example, when the dyſentery or bloody-flux, which is generally an autumnal epidemic, is common, how is it poſſible to determine that it is infectious, as it is generally reputed to be. For when a diſeaſe is epidemic, how can it poſſibly be aſcertained that any one catches it by infection? In a ſeaſon when fevers were epidemic, I have known divers perſons of the ſame family, though above twenty miles diſtant from each other, ſeized with the ſame fever nearly about the ſame time. Probably if they had been at home, it would have been concluded they had caught it by infection one from another.

Upon the whole, no prudent and cautious phyſician will raſhly pronounce any epidemic fever to be a *putrid* one in the modern uſage of that term. Indeed I am of opinion, that out of regard to the eaſe and quiet of the minds of the public, no fever ſhould be pronounced *putrid* and *infectious*, which is the ſame as calling it peſtilential, without the ſanction of a conſultation of judicious phyſicians. Leſt therefore, under the ambiguity of the term, practitioners who are fond of the word *putridity*, ſhould ſtill uſe it when ſpeaking of fevers under their care, they ought to be deſired to explain themſelves, and tell in which of its ſenſes they uſe it.

SECTION II.

THE remote inherent cauſe of fevers, is a ſubject of ſome obſcurity, and has been but obſcurely treated of by the great variety of authors who have handled it. The cauſe of the worſt kinds of fevers both continued and intermittent, has been generally referred to ſome exceſs or depravity of the fluids, moſt generally of the bile; but I am not certain whether that ought not rather to be accounted an effect, than a cauſe of the diſeaſe. Some ſymptoms are ſo early and in a manner coeval with the diſeaſe, that it is not at all wonderful to find them fixed upon as the cauſes of it. I am of opinion, that the moſt obvious and direct prediſpoſing cauſe of all fevers, ought to be attributed to a *morbid ſtate of the ſkin*; particularly, to a decay or deficiency of the circulation of the red blood, in its finer veſſels to which it ordinarily extends in a ſtate of health.

It is generally allowed that a certain degree of rigour or coldneſs is the immediate prelude to all fevers. As the red blood is the origin, ſeat and elaboratory of animal heat, a deficiency in the extent of its circulation along the veſſels of the ſkin, of courſe produces a ſenſation of coldneſs.

Whether the ſkin has ever been conſidered as ſuch or not, *it certainly is as much a vital organ as any of the internal viſcera* that are accounted ſuch. Nay more, it is not only of equal importance with any of theſe in reſpect of its proper or *private function,* but it is the *regulator* of the integrity of the action of all the internal viſcera; being the periphery or boundary of our ſyſtem, its reaction is the equilibrium which regulates the circulation and functions of all the internal parts: therefore a decay of the vital warmth and energy of the ſkin, induces an oppreſſive momentum or load of the circulation of the red blood upon the internal parts in general: hence that ſenſe of heavineſs, dull pain, internal heat and thirſt, which generally commences with the rigour of a fever or the cold fit of an intermittent.

The ſentient ſolids of the ſkin in the degree in which they are deſerted by the warmth of the red blood,* fall into that vacillatory tremor which mechanically tends to rouſe again and revive the languiſhing circulation in the ſkin: in this they are aſſiſted by that perception of coldneſs annexed to this ſtate of the ſentient fibres, which makes their tremor feel as if it was a faint effort of the will to recal warmth. In fact as that is the deſign of nature in exciting the tremor; that end is produced: for then the hot fit, or what is properly called the fever, commences. But as there is a mechanical antagoniſm in all the operations of nature, and as in every caſe re-action proves equal to action, ſo in the ſame degree that the languor and coldneſs prevailed, and according to the difficulty with which it was overcome, with the like accelerated intenſeneſs does the red blood rebound beyond the ordinary limits of its circulation: for with ſtrictneſs of propriety a fever may be defined a general *error loci*, or *propulſion of the red blood into that ſeries of veſſels which do not admit it* in health.

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* In my *medical reſearches*, I have offered ſome conſiderations to prove, that the red blood is the elaboratory and fountain of animal heat.

This I take to be a ſair and plain definition of the animal mechaniſm of a fever, without having recourſe to ſpaſm or ſtimulus, or any more unintelligible cauſes. The heat of the blood, ſcorching regions of the conſtitution which it does not occupy in health, will account for all the ſymptoms of ſtimuli and ſpaſms diſcernible in fevers.

It is very certain that both the height and duration of fevers are proportioned to the degree and continuance of the cold fit or rigour that excites them. If that is ſhort and ſevere, like the trembling fit of an intermittent, the fever that ſucceeds it, may be expected to be high and rapid in its courſe: if on the contrary, it is obſcure and languid, with a kind of laſſitude hanging about one for ſome time, the fever will be of a proportionably low and tedious type. Fevers ſeem likewiſe to derive much of their type from the particular internal part or parts which become

come firſt or moſt oppreſſed by the circulation on its retiring from the ſurface. Thus in the caſe of a pleuriſy, or peripneumony, it ſeems to fall principally upon the pleura or lungs, and in all acute rheumatiſms upon the ligaments and tendinous extremities of the muſcles. I have ſometimes been inclined to think that the cauſe of what were formerly called low nervous fevers, (which are little heard of now, ſince the term putridity became ſo faſhionable) might be owing to the bias of the internal circulation falling in ſuch caſes upon the coats of the nerves, eſpecially near their origin, and ſo greatly oppreſſing their action: it is very certain that in the beginning of ſome of theſe fevers the medulla ſpinalis ſeems greatly affected along its whole courſe.

SECTION III.

A Plain fever is one that is attended with no acute pain or local inflammation. Such generally are the epidemics which prevail from the height of ſummer to the end of winter, and indeed I may ſay, through the whole year; ſince from a general change in people's conſtitutions, febrile inflammations, ſuch as pleuriſies, &c. have become leſs frequent. Plain fevers ought only to be diſtinguiſhed by the ſhortneſs or length of their courſe and period.

We have few examples of ſuch rapid fevers now as terminate in three days. Ardent or ſeven day fevers are ſomewhat more common; but even they are not generally epidemic, being commonly excited by ſome accidental cauſe, or error in regimen that the patient has been expoſed to. Nine or eleven days fevers are exceedingly common, and at the ſame time, the moſt mild and tractable of any ſpecies of fevers, if they are not perverted in their courſe by indiſcreet or injudicious management. The moſt tedious plain fevers that we are acquainted with are ſuch as hold out to the fourteenth or fifteenth day. When fevers ſeem to exceed that period, they ought rather to be accounted relapſes, owing to an imperfect or diſturbed criſis at that time.

The ſhorter a fever is, the more diſtinct and perceptible is its criſis. In long fevers, on the contrary, the ſigns of a criſis are frequently very imperceptible, and the beginning of its decline undiſcernible for ſeveral days.

Every fever conſiſts of, or is diviſible into, three diſtinguiſhable parts. 1. Its *augment*, or the period during which the heat, ſickneſs, thirſt, &c. daily increaſes, till it riſes to a certain pitch. 2. Its *ſtate*, when that pitch to which the fever has ariſen, becomes ſtationary, neither increaſing nor abating for ſome time, proportioned to the quickneſs or ſlowneſs of its augment. 3. Its *criſis and decline*, in which it begins to throw off by perſpiration, urine, or &c. ſome of the concocted matter or fluids (which is the reaſon, as I explained above, why all continued fevers were formerly called putrid ones) and gradually to abate in its ſymptoms. So that the whole courſe of a fever may juſtly be compared to a land-flood, which gradually ſwells to a height, continues at that ſwell for ſome time and then gradually ſubſides. In ſhort, one fit (or paroxyſm, as the learned call it) of a regular intermittent, is an exact repreſentation of all that is tranſacted during the courſe of the longeſt fever. It therefore argues but very little, either ſcientific knowledge, or practical obſervation, to ſay, that a fever may be ſafely ſuppreſſed or ſubdued in any ſtage of its courſe. There are I believe ſuch medicines (or rather poiſons) as are able to produce that deluſive but fatal effect: happily however they are known but to few.

The criſis of a fever may ſometimes with greater ſafety and ſucceſs, be anticipated by forcing a critical diſcharge; but it requires much caution and judgment to diſcern, from the ſtate of the diſeaſe, and the ſtrength of the patient, when that is ſafe: becauſe when it fails, matters are in a hazard of being rendered worſe. Therefore it is the wiſeſt and ſafeſt courſe to moderate and regulate the height of a fever, by a more temperate uſe of thoſe medicines, by which in larger doſes a criſis is ſometimes accelerated. The reader will probably apprehend (and indeed he will not be miſtaken) that in what I have ſaid, I have an eye to Dr.

James's powder. I cannot deny my ſuffrage to its being a valuable and efficacious medicine. I know very well that, upon the ſame principles, a very great variety of medicines of ſimilar qualities may be compoſed: but I can ſee no neceſſity for altering the form of a medicine, whoſe character and doſes are ſufficiently known and eſtabliſhed. I own, I have ſeen it ſhamefully and fatally miſapplied; but that muſt be charged to the account of the adminiſtrator, and not of the medicine. When given and repeated in ſuch doſes as are juſt ſufficient to produce and keep up a ſoftneſs or gentle dampneſs upon the ſkin, it will ſcarcely fail of keeping any ordinary fever within the bounds of ſafety.

In proof and illuſtration of the neceſſity of a criſis in all continued fevers, I will only add: if we reflect that when in health, nature is conſtantly throwing off by ſome evacuation, ſuch parts of the blood as by their continuance in the heat and circulation thereof, are exhauſted of their animal properties and forms: how much more muſt the heat of a fever reduce a far larger proportion of the fluids into that exhauſted ſtate, which becomes a load upon the remaining vital motions, and would ſuppreſs them if they were not expelled.

I have diſtinguiſhed plain fevers by their periods into three kinds, firſt, the ardent, or ſeven day fever. This fever will bear plentiful bleeding, if it is early performed, that is before it has arrived at its height; for this ought to be carefully attended to and remembered, that no fever whether ſhort or long can be benefited by bleeding, and may ſuffer damage by it, after it has attained that ſtage of its courſe. In other reſpects, that fever ought to be treated wholly with cooling internal medicines, gentle laxatives, cooling poultices to the extremities, and tepid bathing of the feet and legs, in order to ſolicit as much as poſſible, the momentum or weight of the fever from the head. In all ſuch fevers, bliſtering is not only uſeleſs but miſchievous.

Fevers that left to nature have their criſis in nine and eleven days, are generally the mildeſt, leaſt dangerous, and, I am apt to think, the moſt common of all epidemic fevers, if they are not irritated by indiſcreet bliſterings, wine, and other hot medicines. I think I have had ſtrong evidences in ſupport of this opinion, having oftener than once in different ſeaſons, ſeen between thirty and forty perſons ſucceſſively in the fever I ſpeak of, without almoſt an untoward ſymptom amongſt them, while at the ſame time, many fevers that were treated with that hot and irritating regimen, were reputed malignant, and proved fatal. This fever will bear bleeding in its firſt ſtage,

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as I have ſaid above ; but even that is not always, nay, I think, not generally abſolutely neceſſary ; its ſymptoms being rarely violent or alarming in any reſpect. The only troubleſome ſymptom I have found attending it, is ſometimes an intenſe head-ach, and at other times, an obſtinate watchfulneſs, or inability to ſleep ; the former generally receives great relief from the application to the forehead and temples of cloths wetted with a cephalic lotion, compoſed of two parts roſe water, one part ſpirit of vinegar, with a ſmall proportion of Hungary water ; at the ſame time applying poultices to the feet, which ought to be renewed every night, and removed in the morning, waſhing the feet then with warm milk and water, and wrapping them up in flannel : the latter ſymptom is generally relieved by adding a few, that is, four or five drops of laudanum in every ſaline draught, which is generally repeated once in five or ſix hours, until reſt is procured.

The fevers that run out to the fifteenth day are naturally attended with more danger, and require more medicines, and other cordials proper to ſupport the powers of life in overcoming the diſeaſe: but if the diſeaſe has been duly attended to from its beginning, even theſe are rarely neceſſary, till the fever is in its *ſtate*, or advancing in its ſecond ſtage; and ſo far as I can truſt obſervation, I am apt to think that *camphire*, and a pretty liberal uſe of wine, will abundantly anſwer the purpoſe. The ſingular excellence of camphire beyond any of either the aromatic or acrid medicines, lies in its being ſtimulating and penetrating, without heating in the manner that the others do. There are a few other medicines which I apprehend have ſome title to correſpondence with it in that ſingular quality, and I am ſurprized that in that light, they have eſcaped the attention of all the compilers of materia medica's and pharmacopeia's I am acquainted with. I ſhall mention three of them, in order to recommend them to the examination and trial of phyſicians. The *agnus caſtus*, the *pyrethrum*, and the *peppermint*: the laſt we are pretty certain may be uſed with ſafety and advantage, in pretty large and repeated doſes. Qu. Was it not expreſly on account of this ſingular and important quality, that the agnus caſtus and camphire, nay even the *mentha vulgaris arida*, were formerly claſſed among the principal anti-aphrodiſiacs, while the *mentha vulgaris viridis*, was, with ſome juſtice, reputed to be of a contrary quality?

In juſtice to Dr. Miller's vindication of the ſafety and importance of the uſe of the *bark* in continued fevers, I muſt ſay, that when ſeaſonably applied, I think it of very great ſervice. I never gave it before a fever was in its ſecond ſtage, or arrived at its height, and when I thought the ſtate of the patient very precarious, then indeed, I have cauſed it to be adminiſtered very liberally, and with great ſucceſs, ſo far as I have a right to judge of the efficacy of a medicine, by the recovery of perſons in ſeemingly moſt dangerous ſituations, who took it—in conjunction, indeed I muſt add, with a pretty plentiful uſe of wine.

I ſhall finiſh what I have to ſay upon plain fevers, with ſome general remarks or admonitions, which may be of greater uſe to the ordinary reader, for whom my hints are principally intended, than any particular practical diſcuſſions intelligible to profeſſional readers only.

1. In regard to diet; it is very common for people to be anxious about the diet of the ſick, and indiſcreet in giving it them; apprehending they will grow faint for want of food, and that it is neceſſary in order to enable nature to ſupport the diſeaſe. This is a common miſtake, for in ſickneſs food is rarely neceſſary, while

the ſick perſon has rather a loathing o it, than a craving for it. There are few drinks given to ſick perſons that are no ſufficient food for them likewiſe: one o the moſt nouriſhing potables, and at th ſame time abundantly light, is weak white wine whey, gently acidulated wit orange or lemon; I cannot ſay that I am fond of animal drinks, though a littl beef tea, or chicken water, eſpecially i they are decocted a little with a goo quantity of parſley may be ſafe. As fo any other more conſiſtent nouriſhmen it ought not to exceed ſtewed fruits, ſuc as prunes, apples, or pears, water pap boiled barley or rice; but theſe la ſhould be adminiſtered in ſmall quantities at one time.

2. Another miſtake among peopl which is pretty common, is, that ther is no occaſion to be anxious about procuring paſſages by ſtool, to perſons i fevers; becauſe, ſay they, as they ea

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one, there can be no recrements of food o be diſcharged : but therein they are reatly miſtaken, not knowing what large proportion the humours colected from the glands of the inteſtines orm of that excretion ; nor how much it ontributes towards allaying the internal eat, to have it from time to time reguarly diſcharged, and to prevent its rebſorption into the blood as much as oſſible : becauſe from the heat of the ever it acquires an additional fetidity nd noxiouſneſs ; therefore, when nature s deficient in that reſpect, it is always afe and adviſeable to aſſiſt her once in wo days at leaſt, by a laxative clyſter, dminiſtering on the intermediate evenngs an emollient anodyne clyſter; to be etained, which contributes greatly to he coolneſs and quietneſs of the patient. This exception however muſt be attended to ; not to be ſolicitous about procuring ſtools when there is any appearance of a critical eruption. A natural looſeneſs is never to be diſcouraged, as long as the ſtools are excrementitious, o charged with black bilious ſtuff; bu when they are watery and exceſſively liquid, all poſſible means ſhould be uſec to check them, for they drain the blooc of its fluid parts, render the ſkin parchec and dry, and bring the patient into th utmoſt hazard.

3. There is nothing that mankind i general need to be more fully apprize of, than the importance and neceſſity o attending to the firſt invaſions of fevers that is, the very firſt and ſlighteſt ſymptoms of unuſual chillineſs, liſtleſſneſs laſſitude, and obtuſe pains about th back and loins. It is impoſſible to conceive how many fevers may be entirel prevented, and how many may be alleviated in their ſymptoms and danger b ſuch an early attention; which require no further management than reſtorin warmth, keeping the bed, promoting

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free perſpiration, a light diet for ſome time, and afterwards uſing ſome gentle laxatives. I am fully perſuaded that ten fevers prove dangerous and fatal, from a neglect of them in their firſt ſtage, to one that proves ſo from any original putridity or malignity in its nature.*

It happens ſometimes, more eſpecially to people of pretty firm and robuſt conſtitutions, and who are unaccuſtomed to ſickneſs, that they go about with a fever upon them for more than half its courſe, without perceiving any ſigns of its exiſtence, but thoſe of its firſt invaſion above-mentioned, or a ſenſe of confuſion, feebleneſs, and thirſt. I would wiſh every reader to obſerve, that in my experience (I do not know how it may have happened to others) I ſcarcely ever knew a perſon in theſe circumſtances recover. Exertion of every kind tends to exaſperate the diſeaſe, and render its violence invincible.

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* See, advice to the military, &c.

4. It is a caution of no ſmall importance in all fevers, eſpecially in tedious ones, to pay a particular attention to the keeping of the mouth clean, which is the buſineſs of the nurſe, or the perſon who attends the ſick, but in general is too negligently executed. It is not the making a faſhion of doing it once or twice a day that will be at all ſufficient; the mouth and lips are often neglected in a ſhameful degree, which increaſes the anxiety and ſtupidity of the ſick, and renders them inſenſible of their own thirſt; that ſalutary ſymptom which nature has provided to excite in them a demand for diluting drinks, the moſt indiſpenſible medicine and cordial in all fevers.

Nor is it of ſmall conſequence to pay a ſtrict attention to the poſture of the ſick, keeping the head always duly elevated, and the body always, if poſſible in a lateral poſture. I know not a more danger dangerous ſymptom in fevers than the patient lying always ſupine.

I ſhall cloſe my obſervations with the following cautions relative to bleeding and bliſtering. 1. Bleeding ought never to be attempted when a fever has arrived at its full height. After that period it can have no effect in lowering the fever, and it may weaken the remaining powers of life which are combating it. 2. Bliſters ought never to be employed till poultices, ſinapiſms, and theſe combined, be repeatedly applied to the extremities, and every other poſſible method of revulſion uſed to prevent or ſuppreſs a delirium or ſtupor. I would not be underſtood to condemn the uſe of bliſters in the caſes of local pain: then indeed they are highly uſeful, applied, as in the pleuriſy, to the ſeat of the apprehended inflammation, or as near it as poſſible.

Some practitioners ſeem to make bliſters a catholicon for every kind of fever without diſtinction, and to think their practice not ſufficiently juſtified, unleſs the poor patient is half excoriated before he dies. Of all topical ſtimulants, Spaniſh flies are the moſt futile, and ſlow in their operation; where ſuch medicines are neceſſary, to ſupport the progreſſive motion of the fluids, and the action of the ſolids upon them; muſtard, euphorbium, and twenty other ſimples, ſeem vaſtly preferable to the cantharides; except for the ſhocking purpoſe of producing a ſtranguary.

This ſubject leads me to ſuggeſt a hint to practitioners, relative to many torpid diſeaſes, ſuch as apoplexies, lethargies, incipient palſies, and various ſpaſmodic affections, wherein oppreſſed nature demands not ſlow, but if poſſible, immediate relief. Would not an extemporaneous inflammation, produced by the momentary topical application of a cloth or ſpunge, impregnated with ſcalding water, operate moſt inſtantaneouſly in ſuch caſes, both as a revulſion, and as a rouſing ſhock to the ſyſtem?

I ſhall juſt ſubjoin the two following ſhort caſes, as ſpecimens of the quick and unexpected relief that may ſometimes be ſuddenly produced in fevers, oy revulſion. A country apothecary, vho at the time was a little tipſey, applied large poultices (which I had orlered to a gentleman's feet in a ſevere ever) ſcalding hot. When I returned two lays after, (for it was at a conſiderable liſtance from me) to viſit the patient, the ever was gone; but ſuch an inflammaion and pain was brought upon his feet, s diſabled him from walking for almoſt month afterwards.

The other caſe was, that of a robuſt igorous young man, in the prime of life, in ſo high a fever and delirium, that it required two perſons to keep him in bed. He was ſervant to a gentleman of learning, and excellent underſtanding, with a good deal of the theoretic knowledge of medicine. As there was nobody to cenſure our practice, we agreed to put the patient into a ſemicupium, or half warm bath, and before he came out of it, to pour a tea-kettle full of cold ſpring water upon his head, which was done, and the conſequence was, that he was no ſooner put to bed, than he fell into a calm and ſound ſleep, in which he continued for ſix or eight hours, and awoke as free of fever, as if he had obtained a diſtinct criſis in the natural way.

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POSTSCRIPT.

IT has occurred to me, ſince cloſing the above little tract, that the yellow fever of the Weſt-Indies, and indeed all the fevers Europeans are incident to, upon migrating into tropical latitudes, are an obvious demonſtration of my ſentiments, both in reſpect to there being no eſſential connection between what are called putrid fevers and infection; and alſo in reſpect of all fevers, eſpecially remittent and intermittent ones, being originally diſeaſes of the ſkin. I never heard that the yellow fever was reputed infectious; though it is one that better deſerves the name of putrid or malignant, than any fever commonly ſo called in this country.

The plain reaſon why people of colder climates are ſo ſubject to theſe fevers, upon their paſſing into a hot one, is, the uncommon exhauſtion that their ſkin is ſubject to, by reaſon of the conſtant profuſe perſpiration, by which the exhaling pores thereof ſeem to loſe their elaſticity and re-action, and allow the red blood in the fineſt veſſels thereof to diſſolve wholly, in a manner, into perſpirable lymph.—If I gueſs right, they who upon change of climate are very difficult to ſweat, will be even ſooner obnoxious to fevers, than they who ſweat too much: but then their fevers will be of a higher and more ardent kind, and leſs diſpoſed to remit—but as in this I only write upon conjecture, I ſay no more.—It is very remarkable alſo, and no ſmall confirmation of my opinion, that the courſe which nature generally takes to obviate and prevent theſe acute diſeaſes, which change of climate is ſo apt to produce, is by ſupporting the extenſion of the circulation of the red blood ſo far along the finer veſſels of the ſkin, as to produce ſalutary, critical cutaneous eruptions of various kinds and in various degrees, according to the temperatures of different perſons.

FINIS.

N. B. The author intended to have added to this publication, a ſhort eſſay on the advantages that would ariſe from a more general uſe of the epiſtolary mode of conſulting phyſicians; but being prevented he poſtpones it till ſome future opportunity.